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shallow and weak ones ; and in both of these series the diaphragm and thoracic muscles do not take equal parts. When the diaphragm works much, the other muscles take some rest, and reciprocally. When mind and body are quiet, the respiration is less deep and more frequent, and the diaphragm is somewhat lazier than usual. But a more important fact is, that the number and depth of the respiratory movements are not proportioned to the needs of the organism, and the conclusion drawn therefrom is, that we usually breathe more than is necessary, when in ordinary conditions under the sea-level barometric pressure. For instance, on high mountains we breathe less air than on the sea-level, and do not find ourselves any the worse for it. M. Mosso gives many other very interesting conclusions, some of which refer to the Cheym-Stokes respiratory rhythm ; but we cannot give more than the principal facts in this letter. However, we must quote the singular and unexpected conclusion, that there is no unique respiratory centre. This conclusion seems rather difficult to admit, but the matter is worth investigation. Professor Mosso's memoir is a very long one, and cannot be easily reviewed in a short space.

Another interesting paper on the biological sciences is that of Professor Sanson, on 'The comparison of the living organism as an animated motor with the steam-engine.' His conclusion is that the animated motor is more economical than the engine, if it is asked, not which of the two gives most work, but which gives the kilogram-metre at least cost-price. But this conclusion applies only to cases in which a great expenditure of force is not required. For instance, in cases where twenty horses can do as well as a steam-engine, it is more economical to use the horses, and it is all the more so that less energy is required ; but if fifty horses can do the work of a steam-engine, it is better, that is, more economical, to have it done by steam. Professor Sanson's paper has been published in the *Revue scientifique* of June 19, 1886.

An interesting thesis was published some days ago by M. L. Boutan, assistant of Professor de Lacaze-Duthiers. The subject of it is the 'Anatomy and development of *Fissurella*,' a gastropod mollusk. The most important fact is, that in larval development, *Fissurella* passes by two stages which very much remind us of two adult gastropod forms of life : one resembles *Emarginula* ; the other, *Bimula*.

Among the recent publications I will point to the supplementary volume published for 1886 by the *Archives de zoologie expérimentale et générale*. As this scientific periodical is now overcrowded, some contributors conceived the idea of publish-

ing their own memoirs at their own expense, and making a volume identical with the ordinary one ; as is often done by the *Zeitschrift für wissenschaftliche zoologie* when papers are too abundant. This supplementary volume, printed and bound exactly in the same style as the ordinary ones, contains four memoirs. One is by Y. Delage, professor of zoölogy in the Sorbonne, on a *Balaenoptera musculus* found on the Normandy coast. It contains a number of new anatomical facts concerning this animal, and is accompanied by a series of very fine plates. The second memoir relates to the physiology of muscular contraction of invertebrated animals (with thirty-five *graphiques*), by H. de Varigny, D.Sc. The third is by J. Deniker, D.Sc., and is an excellent monograph of a Gorilla foetus, from an anatomical point of view. Very little has been known hitherto on that subject. The last one is M. Boutan's memoir, of which we have just spoken. This supplementary volume is a very big one, and contains a great many more engravings and plates than the ordinary ones do. It is to be hoped that the enterprise of the authors will prove successful, and encourage other similar experiments. V.

Paris, July 10.

NOTES AND NEWS.

PROFESSOR WEICHELBAUM of Vienna has recently collected the opinions of the leading medical authorities on the causation of pneumonia, and regards the proof of its bacterial origin as abundantly established. He has investigated one hundred and twenty-seven cases, besides having made a large number of experiments, using the material obtained from lungs affected with this inflammation. As a result of his labors, he finds four varieties of micro-organisms in this affection: 1. The *diplococcus pneumoniae*, which occurred in ninety-one of the cases (these are oval, elliptical, or round cocci, and are sometimes in pairs and sometimes form chains); 2. *Streptococcus* was found in twenty cases (this microbe resembles the first variety, but is, as a rule, more spherical); 3. *Staphylococcus aureus* s. *albus* was detected only in secondary pneumonia; 4. *Bacillus pneumoniae*, as its name implies, is rod-shaped (this form was found in nine cases). Whenever other affections co-existed with pneumonia, and appeared to be secondary to it, as in meningitis, pleurisy, or pericarditis, they were determined to be due to these micro-organisms.

—The senate conferees on the naval appropriation bill have receded from their disagreement to the clause making provision for the new observatory buildings. This practically insures the ap-

propriation of fifty thousand dollars to start the work, the entire cost of which is estimated at nearly six hundred thousand dollars.

— Dr. George L. Fitch has for five years been in charge of the lepers in the Sandwich Islands. He gives it as his opinion, based on careful study and attempts to inoculate the virus into healthy persons, that leprosy is not a contagious disease.

— A new and interesting form of stereoscope has recently been described by Mr. Stroh, before the Royal society of England. The apparatus consists of two dissolving-view lanterns placed side by side, each of which throws a magnified stereoscopic picture on the screen. In front of these lanterns there is a rotating disk, portions of which are cut away, alternately shutting off the picture from each lantern. By so arranging the rotating disk as to permit each eye to see only the view from one of the lanterns during its very brief exposure, a stereoscopic effect is produced, the impression of each picture remaining upon the retina of the corresponding eye long enough to appear to be continuous.

— Prof. Charles Upham Shepard, jun., has deposited his collection of meteorites in the national museum at Washington. The collection represents nearly two hundred distinct falls, and contains many exceptionally fine specimens. The iron from Dalton, Ga., weighing one hundred and seventeen pounds, is the largest meteorite in the display, and is almost perfect. Only a small piece has been cut from the lesser end.

— Dr. William L. Dudley, late Miami medical college, Cincinnati, has accepted the chair of chemistry in Vanderbilt university, Nashville, Tenn.

— The volume of the Ray society (England) for 1885 is made up of the late Mr. Buckler's life-histories of British butterflies, with colored plates of their earlier stages. Most of the descriptions have appeared piecemeal before; but the work is rendered more complete by additions from his note-book, and new observations by his friend and colleague, Mr. Hellins. Seventeen plates, with two hundred and fifty-five figures, are given, and the drawings are better than the average. The industry of Mr. Buckler, who made all the drawings, is shown in the remarkable fact that some part, at least, of the history, is given for fifty-eight of the sixty-three British species. It is a pity that no drawings whatever of eggs are given.

— The lectures now being delivered at Oxford by Professor Sylvester on his new theory of reciprocants will appear in the coming numbers of the *American journal of mathematics*. The lec-

tures are presented in quite simple style, and will be exceedingly interesting to all students of the modern algebra, or, more accurately, of the theory of invariants. The first eight or nine lectures will appear in the forthcoming number of the *Journal*, vol. viii. No. 3.

— 'Solar heat, gravitation, and sun spots,' by J. H. Kedzie (Chicago, *S. C. Griggs & Co.*, 1886), is certainly a book which deserves little praise. If one is not convinced by the title alone, he will find, in the rambling speculation of the author, sufficient evidence that he is treating of theories far beyond him, and of the history and development of which he knows nothing.

— The *Sanitary engineer* has collected and published in book form a number of articles which have appeared in that journal upon 'Steam-heating problems.' This collection is published partly because their previous book upon 'Plumbing and house-drainage problems' was well received. The book is intended to be useful to those who design, construct, and have charge of steam-heating apparatus.

— 'Laboratory calculations and specific gravity tables,' by John S. Adriance (New York, *Wiley*), is intended to aid students and analytical chemists in their calculations. The author has collected those tables which are constantly needed in the laboratory, has edited them with care, and it is probable that the book will be found to fill its place satisfactorily.

— Prof. B. O. Peirce of Harvard has recently published 'The elements of the theory of the Newtonian potential function' (Boston, *Ginn*), as he calls it. The book is made up of lecture-notes used by the author during the last four years, and can be used by those familiar with the first principles of the calculus. The author found it difficult to find in any single English book a treatment of the subject at once elementary enough and at the same time suited to the purposes of such as intended to pursue the subject further or wished without making a specialty of mathematical physics to prepare themselves to study experimental physics thoroughly and understandingly. The book is divided into five chapters, — on the attraction of gravitation, the Newtonian potential function in the case of gravitation, the Newtonian potential function in the case of repulsion, the properties of surface distributions (Green's theorem), and electro-statics. There are certainly few better able to produce such a book than Professor Peirce.

— Messrs. J. B. Lippincott & Co. have in press a 'Manual of North American birds,' by the eminent ornithologist, Prof. Robert Ridgway,

curator department of birds in the Smithsonian institution. The work is to contain some 435 illustrations suitably executed, and will conform to the geographical limits, classifications, nomenclature, and nomenclature adopted by the American ornithological union. We doubt not it will be a most important contribution to the literature of the subject, and presume that naturalist and sportsman alike will find in it an aid.

— Mr. N. S. Goss's revised list of the 'Birds of Kansas' gives notes on three hundred and thirty-five species occurring in that state, one hundred and seventy-five of which are known to breed within its limits. This little work contains the results of a large amount of labor, and is highly creditable to its author.

— 'The young collector' (London, *Sonnenschein & Co.*) is the title of a very cheap and convenient series of small handbooks designed for the amateur, tastefully and neatly gotten up, and issued at one shilling each. Four of them, so far, have appeared, on 'Mosses,' by J. E. Bagnall; on 'British butterflies, moths, and beetles,' by V. F. Kirby; on 'Seaweeds, shells, and fossils,' by Peter Gray and B. B. Woodward; and on 'English coins and tokens,' by L. Jewitt and B. V. Head. These little handy handbooks contain simple directions for the collection and preservation of specimens, with a general introduction to scientific classification, habits, etc., interspersed with numerous engravings. To the boy or girl with an awakening propensity to collect (and every healthy boy at some period of his career has a more or less enduring hobby of some sort or other), these little works will serve as useful guides even in America. Why cannot some publisher get out similar and as cheap handbooks, more expressly serviceable for the young American collector?

— The longest clock pendulum known is said to be one in Avignon, France, measuring sixty-seven feet, to which is attached a weight of one hundred and thirty-two pounds. Its movement is slow, passing through an arc of between nine and ten feet in four seconds and a half.

— Mr. J. H. Long, in a recent paper on the microscopic examination of butter, arrives at the conclusions, that, "taking all things into consideration, we have no absolutely certain method of distinguishing between butter and some of its substitutes, and that, of all methods proposed, the microscopic are perhaps the least reliable." These conclusions are similar to the ones reached by Prof. H. A. Webster, but are directly opposed to those of Dr. Taylor.

— The mortality of horses in New York City

during 1885 reached nearly seven thousand; and during the past six years nearly forty thousand dead horses were received at the receiving-docks.

— Recent researches by Messrs. Coleman and McKendrick of England, on the effects of extreme cold on certain microbes, especially those concerned in putrefactive changes, show that the organisms are killed by exposure to a temperature of from 80° to 120° F. below zero, though their germs are unaffected, and speedily develop after an increase of temperature.

— We learn from the *Athenaeum* that the necessary funds have been granted for the expenses of the British expedition to observe the total eclipse of the sun on Aug. 29. The party, which will probably include Mr. Maunder and Mr. Turner of the Greenwich observatory, will occupy three stations on the island of Grenada in the West Indies. Totality occurs there about quarter-past seven o'clock in the morning, and lasts very nearly four minutes. A proposal was made some time ago to despatch a German party to Benguela on the west coast of Africa, the most favorable point from which observations could be made; but we have not heard that it has assumed a tangible form. The bill introduced in congress for fitting out an American expedition seems to have been buried with some committee, and it is now, of course, too late for proper preparation, even if the bill could be pushed through.

— The president of the province of the Amazonas, Brazil, has authorized the employment of Francisco Pfaff, of Geneva, Switzerland, as the chemist of the botanical gardens established at Manaus a few years ago. It will be the duty of the chemist to study and report upon the medicinal and industrial properties of the plants of the Amazon valley.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Sea-level and ocean-currents.

THE subject of sea-level and ocean-currents is not so simple that there is not room for differences of opinion. It is not to be denied that exceptionally strong winds, such as Texas northers or those of violent cyclones, often cause considerable changes of sea level in shallow water like that of Lake Erie, or of the thin stratum of the same depth, and much less near the shore, along the Atlantic coast and the border of the Gulf of Mexico, extending mostly to a distance many miles from the coast, where the bottom of the shallow water drops off abruptly into deep sea-water. But the effects of winds of the same strength upon deep sea-water are comparatively very small.

If we suppose Lake Erie to be two hundred miles in length and two hundred feet in depth, and a wind